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# THE PRESENT SIGNIFICANCE OF GERMAN INLAND WATERWAYS<sup>1</sup>

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A clear comprehension of the present importance of inland waterways is only possible when the different kinds are clearly distinguished from one another. In the following pages the service intended for sea-going ships including waterways for joining the two seas, such as the Suez Canal and the North Sea Canal, will not be considered. The lower courses of large rivers made navigable for ocean steamers, such as the Elbe from Hamburg down, and the Weser from Bremen to the sea, will not be treated, as is also the case with entirely artificial canals which make inland towns accessible to ocean ships, such as the Manchester Ship Canal. That these artificial and improved shipping routes can compete in the age of railroads and play an important economic part if technical conditions are favorable, is at the present time beyond dispute.

In this paper only those inland waterways are considered which are navigable by river boats and not primarily for sea-going steamships. At present the two kinds of inland waterways are gradually blending. For instance, the Rhine from Cologne down is available primarily for river boats, and for that reason it is here included, although smaller sea-going vessels run from Cologne to England, and likewise to Hamburg, Bremen and the Baltic ports. Waterways primarily adapted for rafting timber and suitable only in a small degree for boat traffic are not considered in this article.

Most inland waterways which are used entirely or mainly by river boats are divided into two classes: natural and artificial.

<sup>1</sup>This study is an adaptation and translation of the fifth chapter of "Verkehrs-entwicklung in Deutschland, 1800-1900," and is here reproduced by permission of the author, and the publisher, B. G. Teubner, Leipzig, 1906.

The natural include inland lakes like Lake of Constance and the great North American lakes, also rivers even when "regulated" by shortening the windings, dredging the channels to uniform depths, narrowing the banks, and by other constructions at large expense for the benefit of navigation or the adjacent lands. As artificial are considered those waterways that carry traffic over watersheds to connect different natural routes, such as the Ludwigs-Donau-Main-Canal, and the Erie Canal connecting the Hudson River and the Great Lakes; and paralleling canals dug along the course of a river not suitable for traffic to obtain a navigable waterway, as for example, many of the French canals and parts of the German Dortmund-Ems Canal. It may be questioned whether canalized rivers, that are made navigable through dams, are to be classified as natural or artificial. To this division belongs the Main between Offenbach and Mainz.

#### *Inland Waterways at the Advent of the Railroads*

The general opinion between 1840 and 1870 was strongly against the ability of inland waterways to carry traffic in competition with the railroads. Let us consider the conditions at the time of the introduction of the railroad. France, the Netherlands, Sweden and upper Italy were already served by a passable net-work of navigable channels; England and the United States had recently sought to construct what these other countries had before provided. It soon became the common belief, especially in England and America, that canals of the old type were less capable of carrying the traffic than the railroads. This unfavorable opinion gradually changed after 1875 in favor of the inland waterways. Such was the case, especially in Germany, where a notable development in traffic capacity of the inland waterways occurred in the period 1875-1905. However, by no means, were all interests glad to see the revival of inland water transportation facilities. The warmest advocates of the new development were those who were dissatisfied with the results of the control of the railroads by the state. Legislative control of tariffs, which had been hoped for at the time the railroads were taken over, has not been realized. The natural monopoly present in the railroad system has been managed by the

administration to the best of its knowledge and understanding, but in spite of this it cannot be denied that in Prussia large profits have been sought, while in Germany as a whole, since 1879, so far as the fiscal point of view has not ruled, the management has been used to favor the export of certain wares and to hinder that of others in furthering the protective tariff policy.

Many of those who were not satisfied with the official administration of the railroad monopoly, including those opposed to the commercial policy followed since 1879, and also many of its adherents, were glad to find in inland navigation a means of moving freight which was independent of the railroad administration. Those who have given a non-partisan attention to the development and traffic-carrying ability of the waterways have been forced, especially in view of the accomplishments between 1875 and 1905, to admit the increased importance of this means of transportation.

### *Causes of Growth of Water Transportation*

On what causes does this advance depend? One important reason for the development of inland water transportation in the second half of the nineteenth century is the freedom from tolls of navigation on natural waterways. River transportation has increased in proportion with the success of the continual movement carried on between 1815-1870 for the elimination of the mediæval tolls on the rivers. Traffic was hindered and made more expensive through centuries by these tolls in return for which no important improvements in the navigability of the rivers were made up to 1800. These hindrances to the natural development of traffic on the more important German rivers were broken down by interstate agreements. The prejudices of the German people against navigation tolls were so great that they finally found expression in a rather radical form in the imperial constitution. It is true the statement is not so clear in form as might have been wished, so that to-day doubts may be expressed as to the meaning of the various clauses.

Article 54, section four, of the German Imperial Constitution reads: "Taxes may be levied on boats on natural waterways only for the use of special facilities intended for aiding traffic. These

tolls, as also those for the passage of such artificial waterways as are the property of the state, may not exceed the amount necessary to meet the costs of administration, and maintenance of the facilities where they are levied. These conditions also apply to all floating timber traffic so far as such traffic is upon the navigable waterways."

The meaning of these clauses is by no means beyond dispute. It is clear that the payment of the interest on the outlay for natural and artificial waterways was not expressly designated. Unfortunately, however, it is not stated how the tolls for meeting the costs of the improvements are to be determined, nor what is to be considered a natural and an artificial waterway. It remains uncertain whether canalized rivers belong to artificial waterways as concerns the levying of tolls. It is fairly clear that rivers not canalized by the use of dams but "regulated," and upon which large sums have been spent for the improvement of navigation are to be considered as natural waterways by these clauses of the Imperial Constitution.

The second cause of the advance of inland water transportation in Germany is a technical one. Inland navigation has received a great advantage in competition with the railroads through improvements in the control of streams, in the building of canals, in boat building, and in the methods of handling traffic. First of all, great advances have been made in rendering rivers navigable. In the first half of the nineteenth century experience proved the practicability of maintaining a minimum depth of water in rivers otherwise not navigable by means of the movable dam.<sup>2</sup> For the "regulation" of rivers, in which great technical advance is being made, and for the canalization of rivers increasing appropriations are being made from public funds.

One conclusion in regard to the building of artificial waterways has become apparent since 1870, viz., a canal on which only small boats drawn by horses can be moved is capable of competition with the railroads only under very exceptional conditions. The fixed costs of such a canal can, under present conditions, seldom be

<sup>2</sup>These are dams regulating the retention and flow of water according to the local needs. Single sections may be taken out of the dam or replaced. The dam can be made complete by the insertion of all sections or entirely removed by taking out the various sections. Such dams work perfectly on the canalized section of the Main between Frankfurt and Mainz.

covered by the income from the usual canal tolls or by increased ability of the surrounding district to pay higher rates. On the other hand canals upon which heavy shipping is possible in boats of 450 to 600 tons capacity, and upon which mechanical power can be introduced for the movement of boats, do not fall under this unfavorable criticism, even in this age of railroads. It is of great importance that heavy traffic should be possible and that rapid forwarding should not be interfered with through many small locks.

Where difficulties of elevation are to be overcome, the new development in canal technique aims to overcome the differences as much as possible by a single lifting instead of through several small locks—the so-called flights of locks. The technical advances of the present day make it possible to overcome at one time by means of chamber locks differences in height of ten meters.

Another means in use at the present time to overcome the great difficulties of lockage is the use of a contrivance to raise ships floating in a chamber filled with water. This elevator method is used in the Dortmund Ems Canal in Henrichenburg, but the newer plan to raise ships on an inclined plane has proved successful as yet only for small boats. Its adaptability for use in heavy traffic is still a matter of dispute.<sup>3</sup>

An important improvement in river and canal transportation in the nineteenth century has come through increase in the size of the boats. The largest boat on the Rhine at the present time has a tonnage capacity above 2,600. In 1902 began the building of iron sailing and tow boats for the Rhine with a capacity of more than 650 tons. The average capacity of the sail and tow boats rose from 182 tons in 1884 to 340 tons in 1902.<sup>4</sup> A Rhine boat of 1,500 tons capacity can carry as much as 150 railroad cars of ten tons burden. It replaces several freight trains, and while in the last half of the nineteenth century the Ludwigs-Donau-Main Canal was built for ships with a capacity of 127 tons, the present projects for canal building provide a waterway to accommodate boats of 600 tons burden.

<sup>3</sup>At Elbing on the Overland Canal, boats of fifty tons capacity are carried on cars, overcoming a fall of twenty-five meters. This is not possible for boats of 600 tons.

<sup>4</sup>See Volume 102 of the publications of the Verein für Sozialpolitik, pp. 89-90.

Great improvements have also been made in the nineteenth century in the traction of boats on inland waterways. Besides the improvements offered by the use of chains for ascending certain rivers, the most important advance has been in the adaptation of steam power.<sup>5</sup> At the present time attempts are being made to adapt electricity to the propelling of boats on inland waterways, and the development of methods of mechanical towage on canals by electrical locomotives, etc., is being actively pushed.

### *Comparison of Present Rail and Water Traffic*

At the present time inland water transportation, even in competition with the railroads, shows a much healthier development than was shown in 1800 in the competition with ordinary roads. This is true with a single qualification. The increase of inland navigation occurs primarily where heavy traffic with the adaptation of mechanical methods of towing or propulsion is possible.

The following remarkable figures showing the advance of German inland water navigation are taken from the work of Geh. Rat Sympher. These statistics give a comparison of the development of traffic on the railroads and inland waterways of Germany since 1875. The incompleteness of official statistics of inland water traffic necessitates estimates for the ton kilometer traffic passing on inland waterways, but these estimates have been made with care.<sup>6</sup> Of course errors are not impossible wherever estimates are relied upon. The statistics in regard to railroads, however, are more reliable. It is further to be noted that there are included 10,000 kilometers of navigable inland waterways in 1875 as well as in 1905; and in 1905 the unimportant navigable sections of the waterways are not included. In this way the showing for the traffic on the waterways in 1905 is more favorable than would have been the case had those portions carrying very little traffic been included in the average. The following figures are offered with these explanations:

<sup>5</sup>The use of steamboats on canals is a much more difficult problem than upon rivers. Screw propellers and sidewheelers damage the canal banks, while no such disadvantages attend their use on rivers.

<sup>6</sup>See as to the method used for the estimates, *Zeitschrift für Bauwesen*, 1891, p. 45.

*German Navigable Waterways, not including River Mouths Navigable by Sea-Going Ships.*

	1875.	1905.
Length .....	10,000 km.	10,000 km.
Arrived, tons .....	11,000,000	56,400,000
Departed, tons .....	9,800,000	47,000,000
Net ton kilometers <sup>7</sup> .....	2,900,000,000	15,000,000,000
Kilometric traffic <sup>8</sup> .....	290,000	1,500,000
Average distance transported....	280 km.	290 km.

*German Railroads*

	1875	1905
Length .....	26,500 km.	54,400 km.
Ton kilometers .....	10,900,000,000	44,600,000,000
Kilometric traffic .....	410,000	820,000
Average distance transported	125 km.	151 km.
Per cent of total traffic:		
Inland waterways .....	21%	25%
Railroads .....	79%	75%
	100%	100%

If it be correct to assume that the length of the navigable waterways remains the same in 1905 as it was in 1875—ten thousand kilometers—the part of waterway traffic in the total traffic (24 as compared with 21 per cent) has increased more than the per cent of the rail tonnage, although the railways rose from 26,500 to 54,400 kilometers in length.<sup>9</sup>

There are three ways in which the statistics of traffic may be presented: The first possibility is to ask how many tons have passed on a certain route. The second, to consider the weight and distance carried, thus arriving at a ton kilometer basis, viz., determining how often one ton has been moved one kilometer on a route. The third possibility is to determine the kilometric traffic. The whole number of kilometric tons is divided by the length of the route, and it is found what part of the entire traffic carried falls upon the average kilometer. This is the best method of comparison where we are interested in what the waterway and railroads actually accomplish for traffic. The above figures from Sympher are to be found in the *Zeitschrift für Binnenschifffahrt*, 1907, p. 496, *et seq.*

In reckoning average distance transported it is sought to answer the following question: How many kilometers on the average does a ton of freight, once delivered to the waterway or railroad, travel before it reaches its destination?

If the length of German waterways in 1900 be taken as the same as in 1875, their character was markedly improved. Major Kurs, however, reckons the length of the navigable canals and rivers in Germany in 1894 as greater than that given by Sympher, namely 12,223.02 kilometers. Including the navigable inland seas and harbors, etc., Major Kurs counts 14,939.37 kilometers in Germany. See page 10 of the Tabulated Report Concerning the Navigable Waterways and the Waterways for Rafting Timber in the German Empire. (Major Kurs, Berlin, 1894.)



Kilometric traffic was, if Sympher's estimates are to be trusted, much smaller by water in 1875 than upon the railroads. In 1905 the average traffic on railroads had risen greatly, but that upon the waterways had increased even more so that it (1,500,000 ton kilometers) exceeded the kilometric traffic of the railroads (820,000 ton kilometers). The kilometric traffic of the German waterways at the present time is greater than that upon the French waterways.<sup>10</sup>

These figures are indeed remarkable. However, a warning must be given that careless conclusions must not be drawn from these estimates. In the first place, in the statistics presented, only a part of the traffic carried by the railroad is compared with practically the total of that by waterways. Passenger traffic, which plays a large part in the case of the railroads, plays a very unimportant one on the water routes; but even in the case of freight traffic we must be careful not to overestimate the importance of these figures however great that may be. Though the average carriage in Germany per kilometer on the waterways in 1900 was greater than on the railroads, nevertheless we must not conclude that more freight was actually forwarded on these routes. That is not the case. The total amount of freight forwarded is in fact very much less on waterways than on the railroads.

If a fourth of the total traffic in ton kilometers is carried on the inland waterways and three-fourths on the railroads, this does not mean that one-fourth of the freight went on the waterways instead of on the railroads. About 16.2 per cent of all freight arrivals used waterways; but the once-loaded freight used the waterways on an average of 290 kilometers, and, in the case of the railroad, only 151 kilometers; therefore, in waterway traffic the figures for ton kilometers become especially large.

The distance from the shipping point to the destination does not always indicate the actual service rendered by water. Roundabout routes are necessitated by the course of the streams. Besides that, the cheapness of the waterway oftentimes justifies a great diversion from the direct route; thus greatly increasing the kilometer tons but not equaling the higher charges levied by the railroads. A remarkable example of this may be cited. In 1891 a large quantity of soda was to be sent from the Würtemberg

<sup>10</sup>The kilometric traffic on the French inland waterways is given by Sympher for 1905 as 411,000, as compared to 182,000 in 1875.

town of Heilbron to Tetschen in Bohemia. The railroad route was evidently the shortest but the soda was not sent thus, but was sent down the Neckar, then laden into a Rhine boat, again transshipped at Rotterdam and brought to Hamburg, where, after another reloading, it was taken up the Elbe to Tetschen. In spite of all this the freight charges were cheaper than upon the railroad. Further, the development of inland water traffic in Germany in the period 1875-1905 must not be believed to be the same on all routes. The greater proportion of the total inland water traffic in 1905 took place upon the Rhine and Elbe which carried 66.9 per cent of the entire amount. Great advances have been made upon the Oder and Weser, and also to a lesser degree on the Donau. Besides these instances the only advances made were upon those few canals and canalized routes which by 1905 had been made accessible for larger boats. On those waterways where no adaptation to present-day needs has been made a falling off in traffic is shown, even in this late period.

In comparison to railroad lines traversing the same territory, river navigation is able to compete best where transportation of heavy articles of low value not requiring great speed is demanded. Besides this it happens also that non-perishable articles of high value seek the waterways whenever the railroads for any reason demand high freight rates. This happens not only in the case of grain but for a large number of other articles, not included in the cheap special tariffs Nos. 2 and 3.

#### *The Question of Tolls on the Waterways*

The requirements in the Imperial Constitution on the levying of tolls on the waterways have already been presented. It remains to review the actual administration of these provisions and to describe the movement in favor of a change therein. At the present time, in practice, navigation on the open streams, with a few exceptions, is free, while the use of harbors and unloading facilities is often conditioned upon the payment of tolls. On the more important streams the freedom from taxes for the bare use of the waterways is guaranteed not only by the Imperial Constitution but by interstate agreements. On the other hand, the Prussian government levies important tolls on the canalized rivers when opportunity offers, as, for example, on the canals of the lower Main

and on the Fulda between Kassel and Münden, on the upper Oder, etc. Navigation taxes are regularly levied in Germany on the canals even for bare passage. It often happens that navigable waterways not suitable for heavy traffic, such as the Ludwigs-Donau-Main Canal, at the present time, do not pay the cost of maintenance, in spite of high tolls, since the traffic is too small. This is not always the case, however, even on the smaller canals. The waterways near Berlin, although not satisfying in all particulars the demands of present-day heavy traffic, are in much more favorable condition due to the lively business carried on upon them.

The Prussian Minister of Finance reported to the Landtag as follows: "The Finow Canal brings in an income of ten million marks, though it certainly has cost us less than two million marks. The other waterways near Berlin also bring us in a good surplus."<sup>11</sup>

The expenses for inland waterways in Prussia for the period 1881-1897 are given as 398,781,000 marks. Of this amount one-third was for current expenses, maintenance, administration and collection of tolls, and two-thirds for repairs, betterments and extensions. Of the total expenditures between 1891 and 1897, one hundred and forty-nine million marks were upon rivers, and 57,000,000 on the canals.<sup>12</sup> It is disputed whether the expenditures on waterways should be recovered by taxes upon the traffic passing over them, as in the case of railroads. It is urged, on the one side, that the costs must be covered by tolls on shipping, as otherwise one district gets a special advantage from appropriations of state funds. It is argued also that the improvement of the waterways can be carried on only when an income from shipping is secured. Taxes, in return for which something is given, are not to be compared to the old river tolls for which little or nothing was accomplished for traffic. Finally, there are strong advocates for the levying of tolls on inland water transportation (by amendments to the constitution, and the interstate agreements), in order that the Prussian railroads may not suffer an unwelcome competition which partly nullifies the tariff policy favored by those administering them. For the other side

<sup>11</sup>See Schwabe, p. 75. Up to the present time the Finow Canal is available only for boats of 150 to 170 tons burden. Schwabe, p. 130; also Peters, "The Financial Development of the Prussian Waterways." (*Archiv für Eisenbahnwesen*, 1902, p. 749.)

<sup>12</sup>See Schwabe, p. 125.

it is argued that waterways, like the highways on land, should be kept tax free, so that it may be possible to have free traffic by various competing lines. The expenses for improvements may well be covered through increased ability to bear taxation in the districts of land improved by them. Furthermore, the railroad is not an end in itself. When the railroads were taken over by the state it was not the intent to seek after the highest profits possible and to crush every competition that should lessen such profits. Waterways stimulate new branches of traffic, and the railroad traffic itself increases where there is a waterway capable of supplying the needs of commerce. Finally, it is not technically possible to divide the expenses of river improvements between the shipping interests and those of the neighboring districts of land.

My personal belief is that to introduce tolls upon the Rhine and Elbe navigation would be a great step backward for Germany. It is more than apparent that taxes upon river traffic in the end result in a raising of freight rates. To introduce consciously such a thing in the presence of the competition ruling in the world to-day, would be a decided step backward in our policy. Its harm would not be confined to those producing and consuming districts near the waterways.

Inland navigation facilities increase the prosperity of our sea trade. Harbors which lack inland waterways traffic command a too narrow *Hinterland* for a large foreign trade, no matter how well developed may be their railway net. The French to-day point to the prosperity of Antwerp, Rotterdam and Hamburg, and argue that they who wish a great sea trade must supplement their other facilities with a suitable inland waterways system. It is not intended to argue that tolls on canals or to cover the expenditures for large improvements on canalized rivers are objectionable in every case. Improvements that bring important traffic economies may be paid for by a reasonable tax, and within the bounds provided by the Imperial Constitution. For building canals, for the cost of which no tolls are to be levied, funds cannot be gotten from the governments and legislatures without great difficulty. In less degree the same is true of the expensive canalization of river courses.

To sum up, even in countries owning the railroads, so long as it is impossible through legislative regulation of the tariff to control the actual management of the railroad monopoly, the pos-

sibility is at hand that the railroad policy may overlook and harm important national interests. The significance of inland waterways, over which no tariff policy can acquire easy control, lies at present chiefly in the fact that they make possible free competition against the railroad monopoly. They can sooner force the railroads, through competition, to give better rates than can be the case through other methods of procedure. Nationalized railroads may be managed to favor protective tariff policies. Freedom of traffic upon waterways prevents such a development.

The advantages of inland waterways are:

1. They can carry bulk freight of non-perishable variety long distances by water cheaper than these commodities can be forwarded by railroad.

2. Traffic facilities are here offered which are independent of any economic policy favored by the management of the railroads. All freight may be carried with charges dependent solely upon the actual cost of the service.

This estimation of the importance of inland waterways at the present time does not lead to the conclusion that all projects for canals which are presented, whether technically or financially sound or not, should be favored; but, on the other hand, this investigation proves that a plan for improving inland waterways, technically and financially sound, should not be opposed merely because of the fear of the competition such facilities would bring to the traffic on other transportation means. Never in history have the agriculture and industry of a people declined because good methods of transportation were furnished through the country, but the downfall of many peoples, not only in trade and industry, but also in agriculture, has come when they neglected to maintain the great lines of communication used by international commerce.

*The Prussian Law of April 1, 1905, for the Maintenance and Extension of Waterways*

After the first plan of the Prussian government for joining the Rhine and the Elbe by an inland canal had been frustrated by the Prussian Landtag, a new proposition was finally passed as a compromise on the first of April, 1905. By this law 334,575,000 marks are granted to build a canal from the Rhine to Hanover and Linden. Various enlargements are provided including a deep

waterway from Berlin to Stettin and other improvements, chiefly connected with the Oder. There is a provision that the users of the canal shall pay tolls and that the provinces and other public organizations through which the canals pass, such as Bremen, shall contribute to the interest and sinking fund on the capital raised for the projects in so far as these charges may not be met through the tolls on shipping.

A rather broad right of expropriation is reserved to the state. A waterways council is to be created from representatives of the government, of other organizations involved, and of the provinces guaranteeing for interest. Besides the decision to substitute for the Rhine and Elbe Canal a system reaching from the Rhine to the Weser and Hannover, the law introduced two other important modifications.

Paragraph eighteen reads: "Only the towage provided by the government can be used on the canals from the Rhine to the Weser and the branch to Hannover, and on the branch canals of those waterways. The establishment of mechanical towage on these routes is forbidden to private individuals. The movement of ships with their own propelling force over these routes is to be permitted only under a special license. Further provisions concerning the towing monopoly and the furnishing of the necessary capital are to be provided by a special law."

Paragraph nineteen reads: "Shipping tolls are to be levied on the rivers 'regulated' in the interests of navigation. These tolls are to be so adjusted that their yield shall make possible a reasonable interest payment and sinking fund on the capital which the state shall raise for the bettering or deepening of each of those rivers, in the interest of navigation, above their natural depths."

It remains to be seen whether, at the completion of this canal, its extension to the Elbe will be provided for; whether the interstate treaties and provisions of the constitution which have forbidden thus far the raising of tolls on navigation on free streams will be changed; whether, finally, the state towing monopoly on the Rhine and Hanover Canal will actually be established. If the intentions of the legislators of 1905 are realized in these particulars, it is evident that a development of freight traffic which will counteract the Prussian railroad tariff policy will be impossible on the inland waterways. If the railroad tariff policy remains protective and friendly to the syndicates, it will, under the above conditions,

find no true correction through the operation of the canals. Likewise, the inland waterway system will gradually cease to be a competitor against the railroad monopoly through the fact that the same interests which control the latter in favor of the protective tariff will dominate the former also for the same end.

Apropos of this estimate of the canal law the table on page 260 is significant.

It is further to be noticed that carrying through this plan that each river should bear the cost of the improvements made upon it would be especially burdensome to the Mosel, Weser, Weichsel, Memel and Warthe rivers. Upon these the traffic would, beyond doubt, fall off and their yield in tolls would be disappointing. If an eastern and western canal net were joined, all being subject to tolls under the canal law, the eastern division, including the streams at the present time free, would be seriously handicapped. The plan to make the streams bear the burden of all expenditures formerly made upon them is against all justice. The government should, as it has done in the past, assign a part of these expenses *à fonds perdu* as their benefits accrue largely to interests other than those of navigation. Future expenditures also, which work toward the cheapening of transportation, need not be met by special levies, but can be paid through the general increased ability to bear taxation.

At the present time the Prussian government is earnestly working to get the support of interested factions for a project establishing tolls on river navigation. What the result will be cannot yet be stated. Formerly the argument of the interests of the state railroads and that concerning protection against the import of cheap grains were prominent in this connection, but recently the argument has been emphasized that expenditures for the bettering of waterways should be paid by the waterways themselves, and an extensive program has been mapped out under this plan.

In this way the navigation interests have been divided into two camps: Those which are burdened with tolls at the present time are played off against those interests using the tax-free streams. To the first class the hope is held out that in the future the tolls upon them will be lessened if the heretofore free streams are compelled to contribute to the canal funds. All this is in the future.

*Statement of the Amount of Tolls that must be raised on the more important River Courses to give a yield, above current Maintenance and Administration Charges, of 3½ per cent for Interest Payments on the Capital Invested and of a Contribution to a Sinking Fund.*

1	2	3	4	5	6	7	8	9
	Cost of construction and "regulating," 1866-1897, with a reduction of 50% due to expenses other than in the interest of navigation.	Expenditure for interest (3½%) and sinking fund on the improvements due to shipping.	Cost of maintenance and administration.	Total yearly expenditures	Income from tolls on traffic 1897-8. (The dues for use of safe harbors and other navigation facilities included.)	Yearly deficit.	Million kilometer tons carried.	Toll on each kilometer-ton necessary to cover the deficit.
	Marks.	Marks.	Marks.	Marks.	Marks.	Marks.		Pfenning.
1. Rhine .....	17,000,000	595,000	1,235,000	1,830,000	142,000	1,688,000	4,045	0.04
2. Mosel .....	1,250,000	44,000	214,000	258,000	.....	258,000	6	4.3
3. Weser, down to Bremen .....	4,180,000	146,000	537,000	683,000	15,000	668,000	109	0.6
4. Elbe, down to the mouth .....	11,015,000	386,000	1,514,000	1,900,000	95,000	1,805,000	2,475	0.07
5. Oder, down to Schwedt, except the canal division .....	11,790,000	413,000	1,560,000	1,973,000	125,000	1,848,000	751	0.2
6. Warthe .....	3,150,000	110,000	542,000	652,000	5,000	647,000	88	0.7
7. Weichsel and Nogat .....	10,990,000	385,000	1,991,000	2,376,000	37,000	2,339,000	175	1.3
8. Memel .....	6,310,000	221,000	312,000	533,000	.....	533,000	112	0.5
Total .....	65,685,000	2,300,000	7,905,000	10,205,000	419,000	9,786,000	7,761	0.13



One great scruple is that the height of the navigation tolls are to be set by the administration and not through laws; at all events, immoderate tolls will yield nothing, as the inland transportation interests will be ruined. It is expected that the administration would be inclined to grant lighter tolls than the legislature and that they would be more independent of selfish interests. It is still to be proved whether these expectations are justified.

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